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Artificial Markets under a Complexity Perspective

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The focus of this study is to build, from the ?bottom-up?, a market with artificially intelligent adaptive agents based on the institutional arrangement of the Colombian Foreign Exchange Market (1994-1999) in order to determine simple agents? design, rules and interactions that are sufficient to create interesting behaviours at the macroscopic level ? emerging patterns that replicate the properties of the time series from the case study. Tools from artificial intelligence research, such as genetic algorithms and fuzzy logic, are the basis of the agents? mental models, which in turn are used for forecasting, quoting and learning purposes in a double auction market. Sets of fuzzy logic rules yield adequate, approximately continuous risk and utility preferences without the need to fix their mathematical form ex-ante. Statistical properties of financial time series are generated by the artificial market, as well as some additional non-linearity linked to the existence of a crawling band. Moreover, the behaviour of the simulated exchange rate is consistent with currency band theory. Agent?s learning favours forecasting rules based on regulatory signals against rules based on fundamental information. Also, intra-day volatility is strongly linked to the rate of arrival and size of real sector trades. Intra-day volatility is also a function of the frequency of learning and search specialisation. It is found that when a moderately low frequency of learning is used, volatility increases.

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